

NextGen: HN unit specification

Advanced Plant Biology (SCQF level 8)

Unit code: JFAO 48

SCQF level: 8 (24 SCQF credit points)

Valid from: August 2026

This unit specification provides detailed information about the unit to ensure consistent and transparent assessment year on year. It is for lecturers and assessors, and contains all the mandatory information you need to deliver and assess the unit.

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Unit purpose

This unit develops learners' knowledge of plant biodiversity in the context of evolution and adaptation, contextualises mechanisms of plant physiology, advances learners' knowledge of plant breeding principles, and allows them to apply a range of practical laboratory techniques relevant to the topics discussed.

On completing the unit and on achieving the HND, learners may be able to progress to degree programmes in Horticulture. Alternatively, they may want to go directly into employment in the horticulture industry or related work placements.

Entry requirements

Entry to this unit is at your centre's discretion. Before starting the unit, learners would benefit from having a foundation knowledge of plant biology, ideally having completed Plant Biology at SCQF level 7, on which this unit expands. We also recommend that learners have completed one or more of the following:

- HNC Horticulture
- a horticultural qualification at SCQF level 7
- appropriate work experience in horticulture

Unit outcomes

Learners who complete this unit can:

1. interpret plant biodiversity in an evolutionary context
2. investigate plant adaptations to a diverse range of habitats
3. relate plant biology to the principles of plant breeding
4. practice a range of laboratory techniques for plant science

Evidence requirements

Learners must provide the following evidence:

Outcome 1

Learners must gather evidence that demonstrates that they can:

- use appropriate methods to identify plants
- characterise major horticultural plant families, and interpret patterns of evolutionary relationships in these taxa
- describe plant biodiversity and modes of evolution for identified species

Learners' evidence could include a restricted-response assessment (open or closed book), profile and/or case studies, or an e-portfolio.

Outcome 2

Learners must gather evidence that demonstrates that they can:

- describe physiological and morphological adaptations of plants in response to habitat
- investigate the tolerance and adaptive strategies of plants to extreme environmental conditions

Learners' evidence could include a case study, laboratory log, or a presentation.

Outcome 3

Learners must gather evidence that demonstrates that they can relate plant biology to the principles of plant breeding, including that they can:

- characterise the biology of a cell: associated organelles, nucleus, DNA and RNA
- identify the mechanisms of genetics and cell division (mitosis and meiosis)
- explain the mechanisms DNA translation and transcription
- perform combination crosses for F1 and F2 generations, to show dominant and/or recessive allele phenotype expression

Learners' evidence could include a workbook, a laboratory log, or a practical demonstration.

Outcome 4

Learners must gather evidence that demonstrates that they can:

- safely carry out a minimum of three laboratory skills appropriate to plant science including:
 - dissecting plant organs
 - demonstrating practical microscopy (wet and dry techniques)
 - demonstrating basic DNA extraction
- adhere to all legislative guidelines appropriate for laboratory settings

Learners' evidence could include a laboratory log, a practical demonstration, or recorded media blogs.

Knowledge and skills

Knowledge	Skills
Outcome 1 Learners should understand: • global plant families and groupings • in-depth plant anatomy relating to structures and organs • evolutionary biology, at an introductory level • a broad overview of the evolution of plants	Outcome 1 Learners can: • identify a range of plant families and groupings • explain the basic principles of plant evolution • identify adaptive structures in plants, across a range of species
Outcome 2 Learners should understand: • how plants morphologically and physiologically adapt to habitat • different methods of examining plants' tolerance and adaptive strategies to extreme environmental conditions	Outcome 2 Learners can: • identify the effects of habitat on plants • apply appropriate skills to examine tolerance and adaptive strategies of plants
Outcome 3 Learners should understand: • cell biology: ultrastructure, membrane transport • DNA structure, translation and transcription • mechanisms of genetics, cell division and ploidy • plant traits and inheritance (continuation of monohybrid and dihybrid crosses)	Outcome 3 Learners can: • identify the main structures and organelles of a plant cell • explain the mechanisms of DNA protein synthesis • explain the principles of mitosis and meiosis • produce relevant Punnett squares to demonstrate plant traits and inheritance

Knowledge	Skills
Outcome 4 Learners should understand: • appropriate lab techniques for a range of research in plant diversity and biology • plant cell structures and pollen ultrastructure	Outcome 4 Learners can: • dissect plant organs • demonstrate practical microscopy (wet and dry techniques) • demonstrate basic DNA extraction • use other laboratory techniques, as appropriate

Meta-skills

You must give learners opportunities to develop their meta-skills throughout this unit. We have suggested how to incorporate the most relevant ones into the unit content, but you may find other opportunities.

Self-management

This includes focusing, integrity, adapting and initiative. The most relevant are:

- focusing:
 - safely carrying out laboratory skills appropriate to plant science, and using them for research
- initiative:
 - characterising major horticultural plant families

Social intelligence

This includes communicating, feeling, collaborating and leading. The most relevant are:

- communicating:
 - explaining how variations in environment and plant management influence physiology; discussing relevant topics
- collaborating:
 - working in groups; taking part in class activities

Innovation

This includes curiosity, creativity, sense-making and critical thinking. The most relevant are:

- curiosity:
 - dissecting plant organs; predicting plant population phenotypes
- sense-making:
 - identifying plant families and groupings, and their adaptations to specific environments
- critical thinking:
 - assessing common abiotic and biotic stresses

Literacies

This unit provides opportunities to develop the following literacies.

Numeracy

Learners develop their numeracy skills by:

- using laboratory skills and calculations, such as dilutions and concentrations of reagents
- using formulas such as monohybrid and dihybrid crosses, or Punnett squares using Mendelian genetics

Communication

Learners enhance their communication skills by working in groups, developing projects and discussing related topics.

Digital

Learners improve their digital skills and computer literacy by reporting their findings using a range of software applications and platforms. We recommend that you use digital technologies, such as word-processing, spreadsheet and presentation software, to enable authentic assessment.

Learning for Sustainability

Throughout this unit, you should encourage learners to develop their skills, knowledge and understanding of sustainability.

This includes:

- a general understanding of social, economic and environmental sustainability
- a general understanding of the United Nations Sustainable Development Goals (SDGs)
- a deeper understanding of subject-specific sustainability
- the confidence to apply the skills, knowledge, understanding and values they develop in the next stage of their life

Delivery of unit

We recommend that you deliver this unit within the limitations of your centre's facilities and resources, focusing on areas of speciality, drawing on areas of centre expertise, and taking advantage of industry contacts where possible, including site visits.

You can integrate delivery of the unit with Applied Horticultural Research at SCQF level 8 and Sustainability and Innovation at SCQF level 8.

The notional design length for the unit is 120 hours. The amount of time you allocate to each outcome is at your centre's discretion.

Additional guidance

The guidance in this section is not mandatory.

Content and context for this unit

Where relevant, you should encourage learners to apply their skills in practice. This should include lab work sessions, in-class practical activities and site visits.

Outcome 1

We recommend that you use live plant material, at different stages of growth where possible, for identification. We recommend a minimum of twenty plants. Visits to botanical gardens or other plant collections help to contextualise biomes and enhance learning.

Outcomes 2, 3 and 4

We recommend that you facilitate practical activities to embed authentic skills and learning where possible; for example, carrying out plant trials, laboratory and/or glasshouse practicals. If you cannot provide live practical experience, we recommend visits to appropriate sites.

You should ensure that health and safety considerations are central to your delivery of the unit.

Resources

Learners must have access to appropriate laboratory resources. Centres delivering this qualification must have suitably qualified staff for each of the subject components. Your centre should already have established processes to ensure staff are appropriately qualified to deliver in this subject area.

Assessors and internal verifiers must hold an industry and/or subject-specific qualification equivalent to the qualification. Centre staff should have relevant industry experience and be able to demonstrate industry-relevant CPD to maintain their subject-specific knowledge and skills.

Equality and inclusion

This unit is designed to be as fair and as accessible as possible with no unnecessary barriers to learning or assessment.

You must consider the needs of individual learners when planning learning experiences, selecting assessment methods or considering alternative evidence.

Guidance on assessment arrangements for disabled learners and those with additional support needs is available on the [assessment arrangements web page](#).

Information for learners

Advanced Plant Biology (SCQF level 8)

This information explains:

- what the unit is about
- what you should know or be able to do before you start
- what you need to do during the unit
- opportunities for further learning and employment

Unit information

As you study this unit, you develop your knowledge of plant biodiversity in an evolutionary context and practice a range of laboratory techniques. You contextualise mechanisms of plant physiology and learn more about plant breeding principles.

In the unit, you:

1. interpret plant biodiversity in an evolutionary context
2. investigate plant adaptations to a diverse range of habitats
3. relate plant biology to the principles of plant breeding
4. practice a range of laboratory techniques for plant science

Prior knowledge and skills

Before starting the unit, you would benefit from having a foundation knowledge of plant biology, ideally having completed Plant Biology at SCQF level 7, on which this unit expands. Your centre should give you supplementary resources to support learning, where possible.

We also recommend that learners have completed one or more of the following:

- HNC Horticulture
- a horticultural qualification at SCQF level 7
- appropriate work experience in horticulture

You should actively participate with learning outcome achievement and class activities.

Assessment

You can be assessed in a variety of ways, but likely involving a combination of written and/or recorded work, laboratory and practical tasks.

Future progression and employment

On completion of the unit, and on achievement of the HND, you may be able to progress to the BSc in Horticulture. Alternatively, you may be able to go directly into employment in the horticulture industry or related work placements.

Meta-skills

Throughout this unit, you develop meta-skills that are useful for the horticulture sector.

Meta-skills are transferable behaviours and abilities that help you adapt and succeed in life, study and work. There are three categories of meta-skills: self-management, social intelligence and innovation.

Self-management

You develop self-management skills as you focus on researching plant science in the laboratory, and on using these findings to characterise horticultural plant families.

Social intelligence

You develop social intelligence skills as you explain and discuss unit topics with your peers, and collaborate with others in class and group activities.

Innovation

You develop innovation skills as you dissect plants to find out more about them; make sense of the connections between plant families and groupings and what environments they need; and assess plant stressors.

Learning for Sustainability

Throughout this unit, you develop skills, knowledge and understanding of sustainability.

You learn about social, economic and environmental sustainability principles and how they relate to the horticulture sector. You also develop an understanding of the [United Nations Sustainable Development Goals](#).

Administrative information

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Superclass: SA

History of changes

Version	Description of change	Date

Please check [our website](#) to ensure you are using the most up-to-date version of this unit.

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